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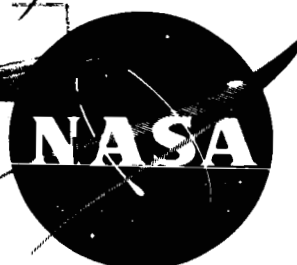
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INSTRUMENTATION OPERATIONS ANALYSIS PART IIB of the FIRING TEST REPORT SATURN VEHICLE SA-2

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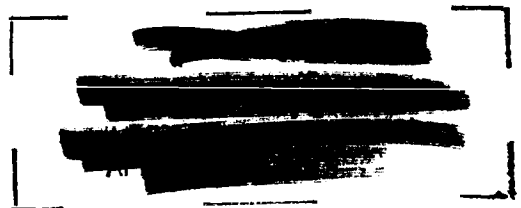
INSTRUMENTATION OPERATIONS ANALYSIS
PART IIb
of the
FIRING TEST REPORT
SATURN VEHICLE SA-2

ROBERT J. CESSAC

(U) ABSTRACT

This report presents the instrumentation systems operated in connection with the launch of Saturn Vehicle SA-2. The period and quality of recorded data for each system are given. Applicable data reduction information is also included. Performance of the instrumentation system used was satisfactory and preliminary analysis of recorded data indicated that the launch and flight were very successful.

Saturn Vehicle SA-2 was launched from Cape Canaveral on April 25, 1962 at 0900 hours 34 seconds EST.




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MTP-LOD-62-7.2b

INSTRUMENTATION OPERATIONS ANALYSIS
PART IIb
of the
FIRING TEST REPORT
(U)

By

Robert J. Cessac

This report contains 2 classified pages.

ELECTRONIC ENGINEERING, MEASURING AND TRACKING OFFICE
LAUNCH OPERATIONS DIRECTORATE



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(U) INTRODUCTION

This report presents the instrumentation systems operated during the flight of Saturn Vehicle SA-2. There are three basic instrumentation systems: Telemetry, Optical Tracking, and Electronic Tracking. Under each system are listed the stations or sites operated, period and quality of recorded data, period of reduction and/or potential reducibility of the recorded data.

(U) SUMMARY OF INSTRUMENTATION PERFORMANCE

I. Telemetry

Good signals were recorded from launch to 162.56 seconds.

II. Optical Instrumentation

A. Fixed Cameras

Good coverage was obtained from launch to 20.2 seconds

B. Cine Theodolites

Good track was maintained from launch to 127.0 seconds.

C. Attitude Data

Three tracking Mitchell's and one Theodolite were used for reduction of attitude data from 0 to 19.35 seconds.

III. Electronic Tracking

A. Udop

Good doppler data were recorded from launch to 162 seconds except for slight noise during cutoff.

B. Radar

Good track was maintained from launch to 162.6 seconds.

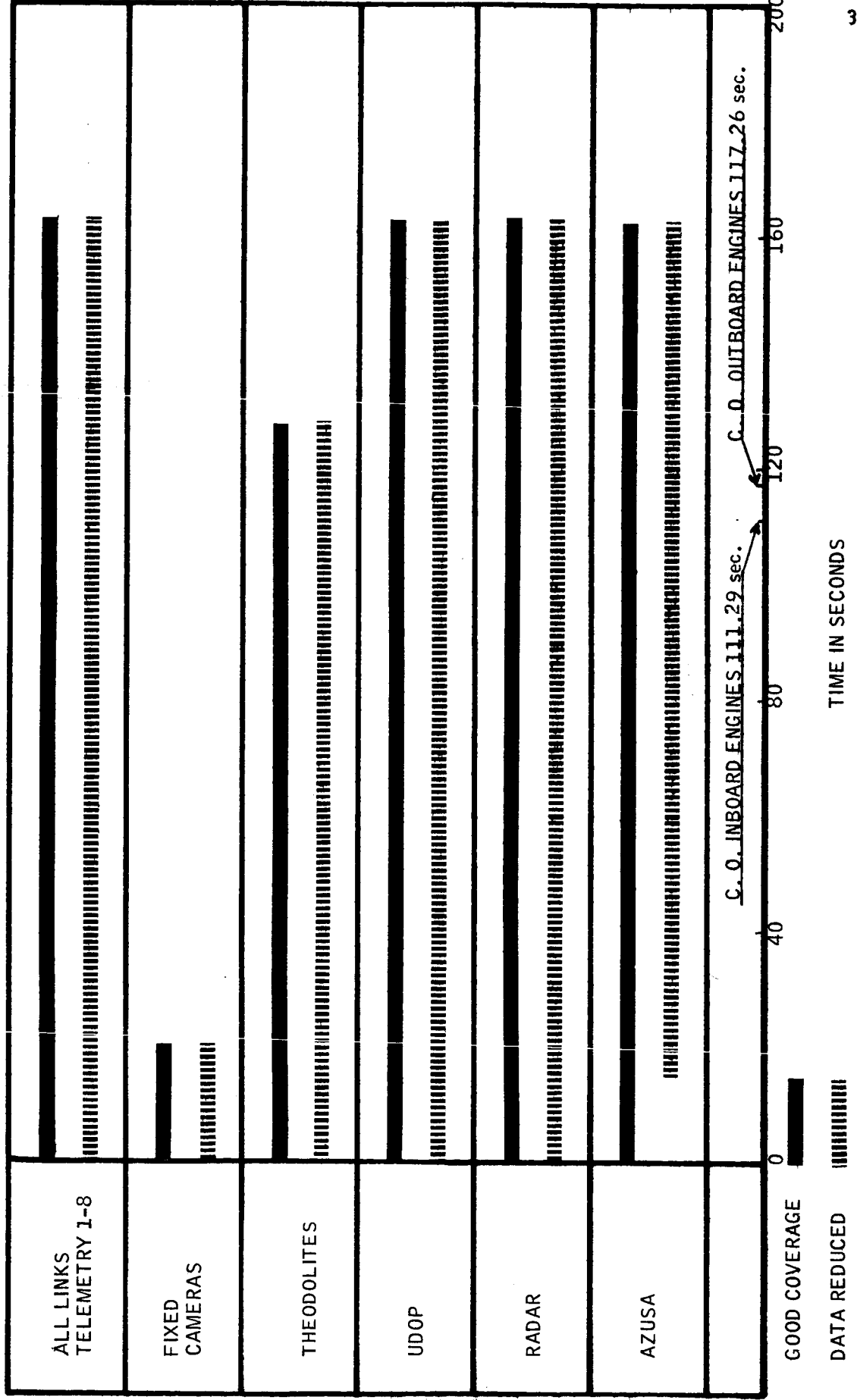
C. Azusa

Track was maintained from launch to 162 seconds.

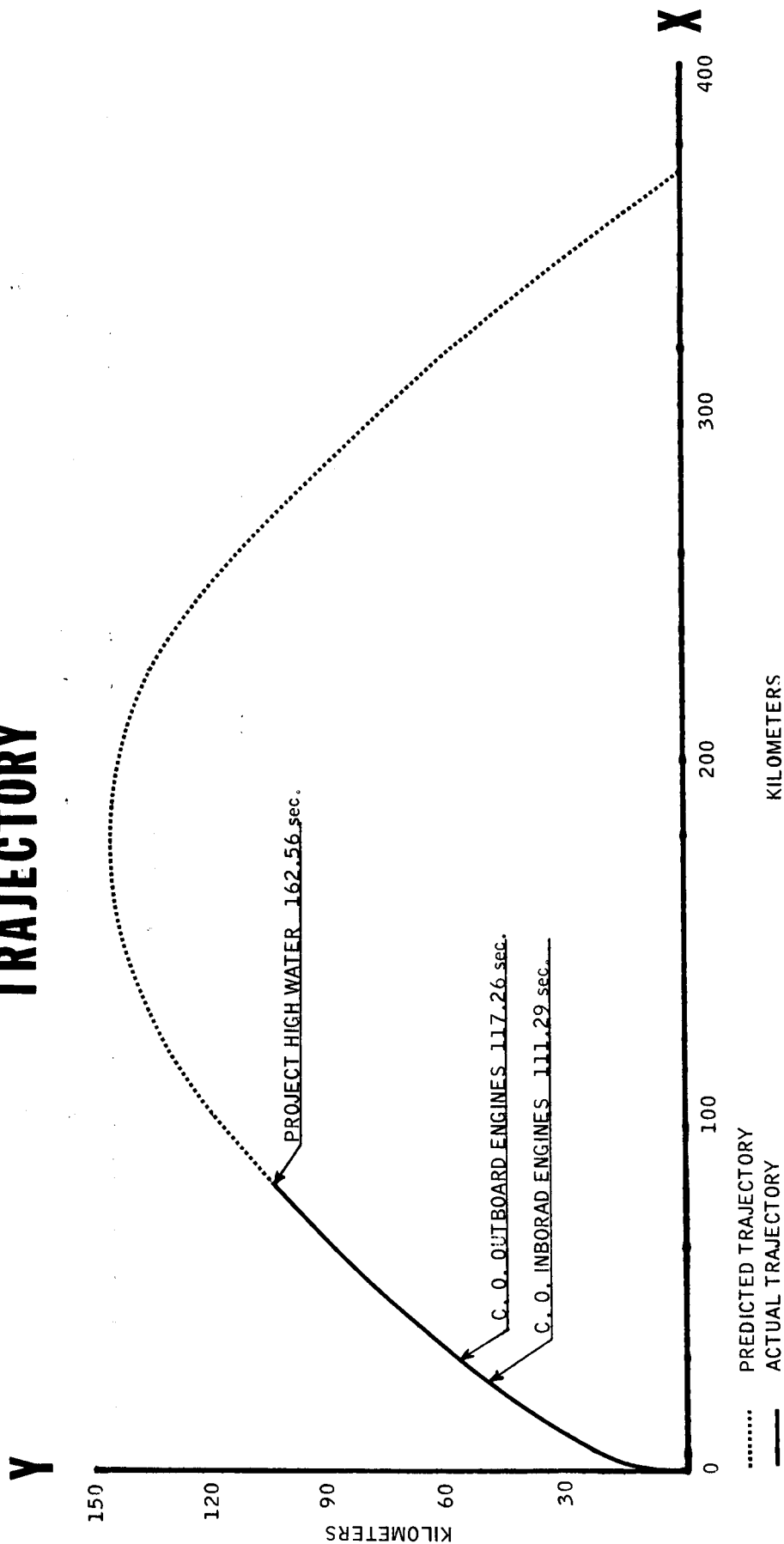
Note: All times in this report are referenced to range zero unless otherwise indicated.

DATA COVERAGE

SYSTEM



TRAJECTORY



TELEMETRY

(U) Receiver Stations Operated:

Hangar D	Cape (Tel 3)
Blockhouse 34	G. B. I.
Cape (Tel 2)	

Coverage:

(U)	<u>Transmitter (Link Nr.)</u>	<u>Frequency</u>	<u>Period of Good Signal Recorded (seconds)</u>
	1	242.0	0-162.56
	2	246.3	0-162.56
	3	248.6	0-162.56
	4	249.9	0-162.56
	5	252.4	0-162.56
	6	253.8	0-162.56
	7	256.2	0-162.56
	8	259.7	0-162.56

(U) Good signals were recorded by Hangar D, Tel 2 and 3 from 0 to 162.56 seconds. G. B. I. recorded signal from 43 to 162.6 seconds. The period from 43 to 46 seconds was noisy and hunting. The period from 46 to 162.6 seconds was good.

(U) Data Reduction:

Telemetry data were reduced and published by AMR from T minus 5 seconds to 163 seconds of flight. Data were processed through the TARE II equipment and then linerized through the IBM 7090 computer utilizing the TARE routine. Cyclic data, such as flowrates, were reduced using the doppler automatic reduction equipment (DARE) in conjunction with the 7090 computer.

(U) OPTICAL-METRIC CAMERAS
Fixed Cameras

Coverage:

<u>Stations Operated</u>	<u>Period of Track (sec.)</u>
34-3 (close in)	0.451 to 7.988
34-4 (close in)	0.451 to 7.988

(U) OPTICAL-METRIC CAMERAS
Fixed Cameras (Continued)

<u>Stations Operated</u>	<u>Period of Track (sec.)</u>
U223L145E	0.451 to 17.260
U242L90N	0.451 to 19.828
U176L46N	0.451 to 20.662
19-2	0.451 to 20.662

Data Reduction:

Trajectory data with estimates of error were reduced and published by AMR from 0.451 to 20.662 seconds. Raw data from the stations above were used during times indicated in period of track column.

Attitude data (pitch and yaw) were reduced using tracking Mitchell U176L46, U142L160, U242L90, and Theodolite 1.10 from 0 to 19.350 seconds.

Attitude data (roll) were reduced using tracking Mitchell U176L46 from .449 seconds to 16.992 seconds.

(U) OPTICAL-METRIC CAMERAS
Cine Theodolites

Coverage:

<u>Stations Operated</u>	<u>Period of Track (sec.)</u>
1.10	4.5 - 45.0 54.25 - 99.25 102.75 - 127.25
1.30	4.5 - 127.25
1.40	2-128.75
1.60	4.5 - 127.25
1.70	47.0 - 123.0
1.80	47.0 - 127.25

Data Reduction:

Trajectory data with estimates of error were reduced and published by AMR from 4.5 to 127.25 seconds. Stations 1.10, 1.30, 1.60, 1.70, and 1.80 were used in the reduction as available. For availability see period of track under coverage above.

(U) ELECTRONIC TRACKING

Udop

Stations Operated:

Uprange System (NASA)

Blockhouse 34
 Blockhouse 26
 Hangar D
 Site C
 Site B
 Playalinda
 Titusville Cocoa A/P
 Merritt Island
 Transmitter UTAH
 MANDY

Downrange System (AMR)

Little Carter
 Bassett Cove
 Great Sale
 Walker Cay
 Allens Cay

Coverage:

Good doppler data were recorded from launch to 162.5 seconds.

Data Reduction:

Trajectory data with estimates of error were reduced by AMR from 11.0 to 162.55 seconds.

Trajectory data with estimates of error were reduced by M.S.F.C. from launch to 162.56 seconds.

Reduction of downrange udop was not attempted since no timing was recorded on the tapes.

(U) ELECTRONIC TRACKING

Radar

Coverage:

<u>Stations Operated</u>	<u>Approx. Period of Track (sec.)</u>	<u>Mode of Track</u>
Mod II 1.3	21-182 (good)	Skin
	182-206 (noisy)	Skin

(U) ELECTRONIC TRACKING (Continued)

RADAR

<u>Stations Operated</u>	<u>Approx. Period of Track (sec.)</u>	<u>Mode of Track</u>
Mod II 1.5	0-162 (good)	Skin
Mod IV 1.1*	2-31 31-134	Infra-red Skin
Mod IV 1.2*	4-59 59-134	Infra-red Skin
FPS16 1.16	0-80 (good) 80-93 (noisy) 93-175 (good)	Beacon Skin Beacon
FPS16 1P.16	6-24 (no track) 24-104 (good) 104-162 (noisy and hunting) 162-192 (very noisy)	-- Skin Skin Skin
FPS16 3.16	45-58 (noisy and hunting) 58-162.5 (good) 162.56 (breakup, tracking pieces)	Beacon Beacon. --
FPS16 3A.16	61-64 (noisy and hunting) 64-162 (good) 162-252 (very noisy) 252-276 (off track) 276-522 (noisy)	Beacon Beacon Beacon -- --

Data Reduced:

<u>Stations Used</u>	<u>Period of Reduction (sec.)</u>
1.16	0-162.8
1P.16	24-111.2
3A.16	64.5-162.8

*Coverage on these stations were taken from the preliminary estimate of data coverage by radar operators. Other coverage times were taken from radar function records.

(U) ELECTRONIC TRACKING

Azusa

Stations Used:

Azusa MK II

Coverage:

Good track was maintained from launch to 162.5 seconds.

Data Reduction:

Trajectory data were reduced and published by AMR from 15.0 to 162 seconds.

(U) OTHER INSTRUMENTATION

I. Range Safety Instrumentation

A. Telemetry ELSSE

Program site 20-107P maintained good track from 4 seconds to 162.5 seconds.

Flight line site 34-100F maintained good track from 6 seconds to 162 seconds.

B. Impact Predictor

The impact predictor performed satisfactorily throughout powered flight. Azusa data were used as input.

C. Radar Plotting Boards

Good plots were obtained from launch to 162.6 seconds.

II. Impact Instrumentation

Since the destruct systems were activated at 162.56 sec., (in conjunction with Project High Water) there was no impact except of debris remaining from vehicle break-up. For this reason, the impact data can not be realistically compared with the nominal trajectory.

The impact instrumentation for this test utilized the Cape 7090 computer with input data supplied by Mark II Azusa System.

III. Optical Instrumentation

A. Engineering Sequential Cameras

Number Operated: 67
Number of Failures: 2

Items 1.2-41 and 1.2-40
(Fixed for prelaunch coverage)
obtained no coverage

B. Documentary Cameras

Number Operated: 34
Number of Failures: 0

IV. Project High Water

A. Engineering Sequential Cameras

Number Operated: 14
Number of Failures: 2

Items 3.2-2 and 3.2-3 (IGORs
at G.B.I.) did not observe vapor
cloud.

B. Documentary Cameras

Number Operated: 4
Number of Failures: 0

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 A-2 TELEMETRY REC HANGAR D
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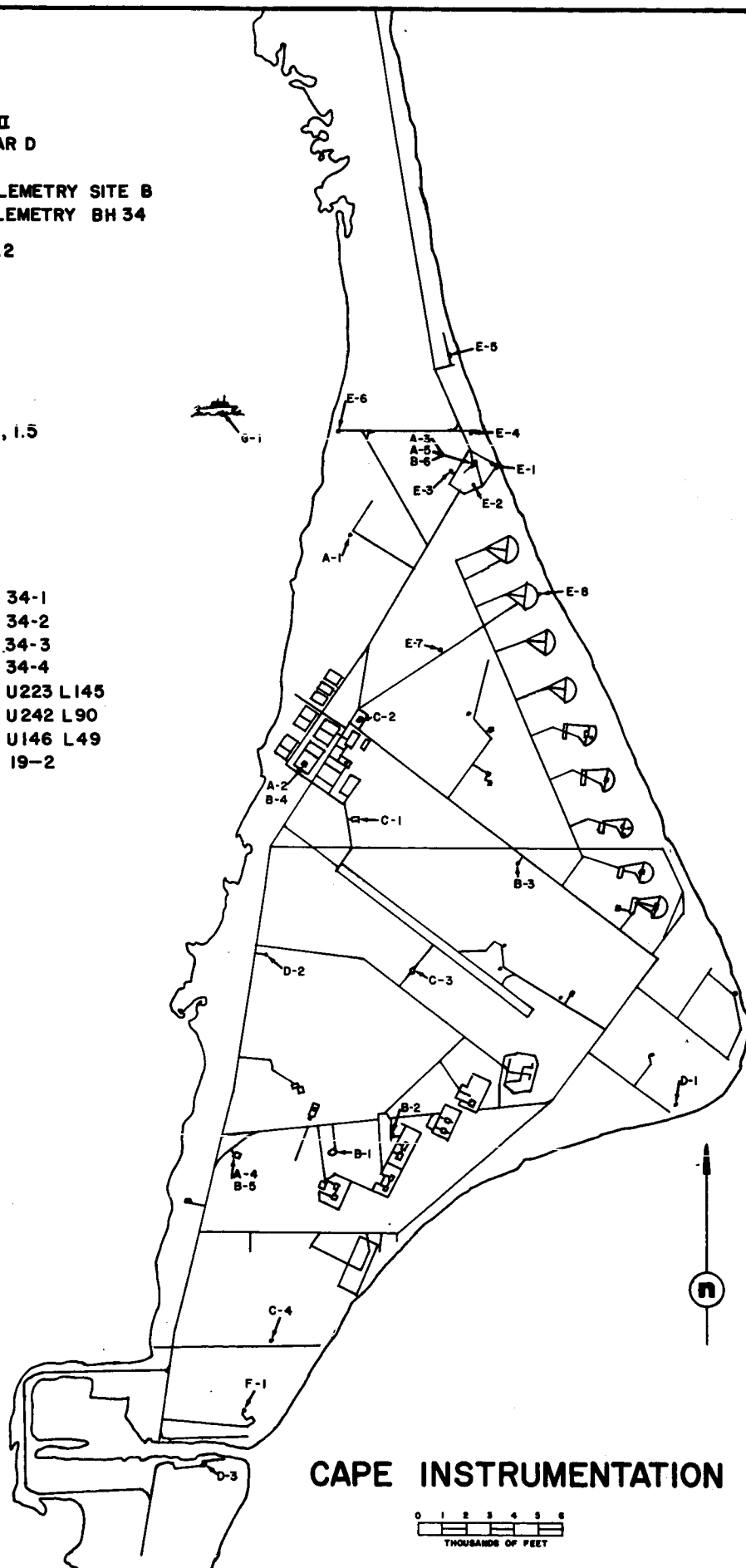
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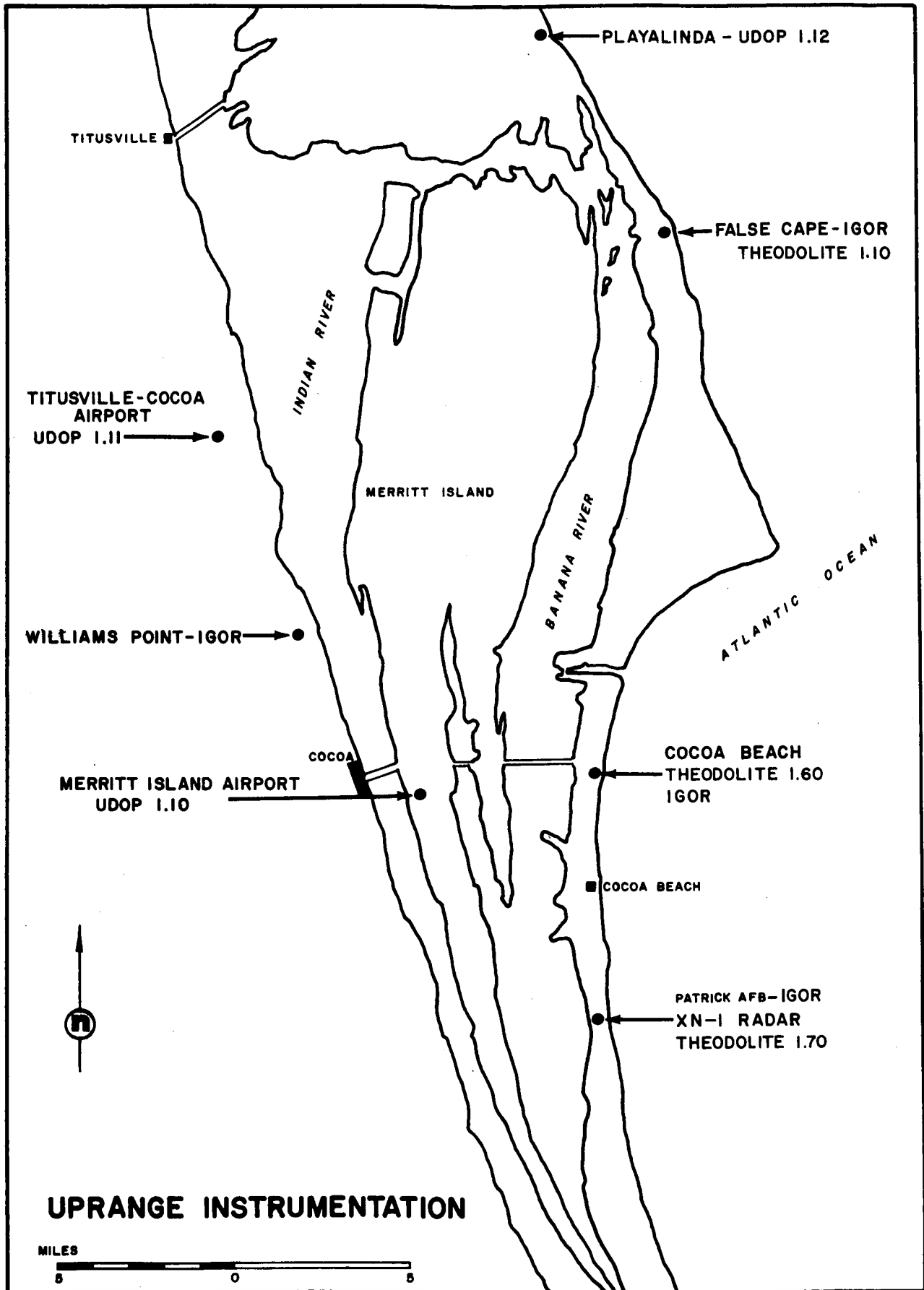
F-1 AZUSA MARK II

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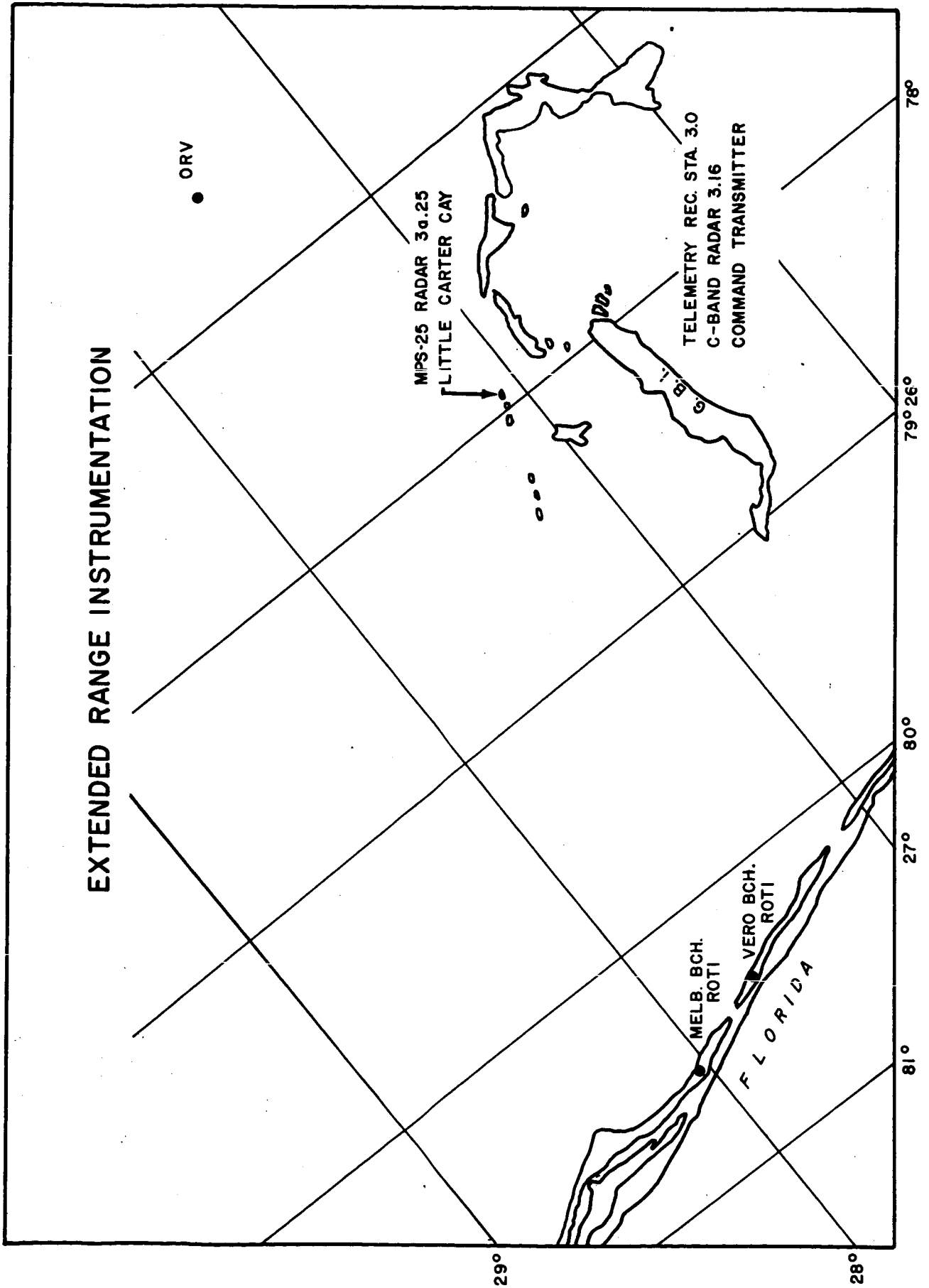


CAPE INSTRUMENTATION

0 1 2 3 4 5 6
 THOUSANDS OF FEET



EXTENDED RANGE INSTRUMENTATION

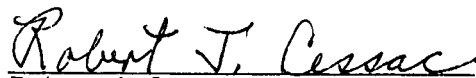


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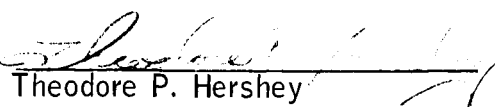
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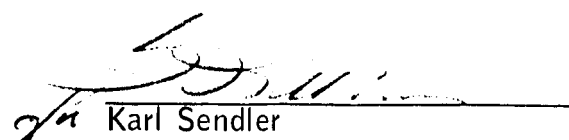
INSTRUMENTATION OPERATIONS ANALYSIS
PART IIb
of the
FIRING TEST REPORT
SATURN VEHICLE SA-2


PREPARED BY:


Robert J. Cessac
AST-Data Systems, Data Office

APPROVED:


Theodore P. Hershey
Chief, Data Office


Karl Sendler
Chief, Electronic Engineering
Measuring and Tracking Office


KURT H. DEBUS
Director,
Launch Operations Directorate

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